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ABSTRACT

The purpose of this study was to compare long-term achievement gains of first, second, and third grade students who attended a public school kindergarten, nonpublic school kindergartens, or no kindergarten prior to first grade entrance. The study also sought to determine whether or not gender and race were related to academic achievement. Dependent variables included all subtest and total scores of subjects on the California Achievement Test. Participants were 134 students with no kindergarten experience, 185 students who had attended nonpublic school kindergarten, and 136 students who had attended public school kindergarten. All students were enrolled in first grade during the 1981-1983 school years and remained in the school system for 4 consecutive years through third grade. Findings indicated that students who had attended kindergarten performed at higher levels of achievement in elementary grades one through three than did students not attending kindergarten. The public school kindergarten group out-performed the nonpublic kindergarten group on the majority of subscales across the majority of grade levels, though the differences were not statistically significant. No systematic significant differences were found on sex. Race was eliminated from all analyses, because it was highly intercorrelated with the preschool effect. (RH)

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A LONGITUDINAL STUDY OF ACHIEVEMENT ASSOCIATED WITH PARTICIPATION IN A PUBLIC SCHOOL KINDERGARTEN

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ABSTRACT

The purpose of this study was to compare long term gains made in achievement in the first, second, and third grades by children who attended a public school kindergarten to gains made by children who attended nonpublic school kindergartens or no kindergarten prior to first grade entrance. The study also sought to determine whether or not the variables of gender and race were related to academic achievement. Dependent variables included all subtests and total scores produced by the California Achievement Test.

The subjects for this study consisted of all students enrolled in the first grade during the 1981-1983 school years and who remained in this school system for four consecutive years beginning with the kindergarten year through the third grade. The sample included 134 students who had no kindergarten experience, 185 students who attended nonpublic school kindergarten, and 136 students who attended public school kindergarten.

Results of the MANOVA analyses indicated that the preschool effect was the only variable which yielded significant findings. The sex effect yielded no systematic significant differences between the sexes. The race effect was eliminated from all analyses because it was found to be highly intercorrelated with the preschool effect. The students who attended kindergarten, public and nonpublic, performed at higher levels of achievement in the elementary grades one through three than the students who did not attend kindergarten. These differences were significant across grade levels.

Significance of the Problem

Researchers and educators can find many studies which support or dispute the positive impact of kindergarten. According to McLean and Nelson (1982), the literature, however, concentrates primarily on the performance of low ability or low socioeconomic students. Therefore, there is a need for research which focuses on longitudinal achievement gains of heterogeneous groups of children who attended public school kindergarten.

Until the Education Reform Act of 1982, Mississippi did not operate public school kindergartens. In 1978, Mississippi enacted legislation which permitted local school districts to establish kindergarten programs if they could find money other than state dollars to fund them. The Reform Act of 1982 mandated that each local school district implement a kindergarten program during the 1986-87 school year. However, this authorizing legislation for kindergartens will be automatically repealed on July 1, 1990. At this time, if public school kindergarten is to continue, the Mississippi State Constitution must be amended to provide for it (Early Childhood Education Grant-in-Aid Program, 1985).

In an article entitled "The Kindergarten Concept: A Necessary Component of the Educational System" (1980), Blackwell reported that many contemporary educators recognize kindergarten as part of the continuum which represents the process of learning. Blackwell wrote that there is a growing awareness among government,

scholars, and business that kindergarten programs for children must move from the bottom of the education agenda to a high priority position. Even though the Reform Act of 1982 provided for public kindergarten from 1985-1990, research data that will be gathered from across the state for the next five years will influence the future of kindergartens after 1990. A look at one public school kindergarten program in existence since 1979 will provide longitudinal data about the relationship between public school kindergarten and future progress in the elementary grades. This information can be used to guide educational leaders in Mississippi in making decisions over the next five years concerning kindergarten evaluation and curriculum.

Statement of the Problem

The purpose of this study was to compare long term gains made in achievement by children who attended a public school kindergarten to gains made by children who attended nonpublic school kindergarten and gains made by children with no kindergarten prior to first grade entrance. The study also sought to determine whether or not the variables of gender and race were related to academic achievement.

Research Design

The design for this study was longitudinal and, by necessity, a correlative ex post facto design. A time-series model was used

for data collection (Campbell & Stanley, 1963). Dependent variables included all of the subtests and total scores produced on the California Achievement Test: Form 10, Level C; Form 11, Level C; Form 12, Level C; and Form 13, Level C. Total reading and total math scores from Form 10, Level C were used as a base line assessment of achievement prior to first grade. Scores available from Form 11, Level C included phonetic analysis, reading vocabulary, comprehension, total reading, language expression, computation, mathematics concept and application, total mathematics, and total battery. Scores available from Form 12, Level C and Form 13, Level C included phonetic analysis, structural analysis, reading vocabulary, comprehension, total reading, spelling, mechanics, language expression, total language, computation, mathematics concept and application, total mathematics, and total battery.

Independent variables for this study were race, gender, and type of kindergarten attended. The subjects were categorized into three groups based on type of kindergarten attendance which included no kindergarten experience prior to first grade, public school kindergarten, and nonpublic school kindergarten. These three groups were examined to determine if there were differences between the public school kindergarten and nonpublic school kindergartens as well as to discern the impact of kindergarten experience on achievement through the third grade. That is, were

the children who had had kindergarten experience achieving at the same or different level and rates at each of the grade levels as the children with no kindergarten experience?

Race and gender were initially used as control variables. In subsequent analyses, race was removed as a variable because of its high intercorrelation with the primary variable of interest, the type of kindergarten experience. Gender was retained as an independent variable for all subsequent analyses to examine academic success in different subject areas.

Population and Sample

The population for this study consisted of all students enrolled in the first grade during the 1981-1983 school years. Of this population, the sample was limited to those students who remained in this school system for four consecutive years beginning with the kindergarten year through the third grade (see Table 1). The sample included 134 students in the group who had no kindergarten background, 185 students who attended nonpublic school kindergarten, and 136 students who attended public school kindergarten. All of the students from this school system in northeast Mississippi were six years old on or before September 1 of their first grade year.

Instrumentation

As part of this school's normal testing policy, all children

Table 1

Subjects

	No Kindergarten				Nonpublic Kindergarten				Public Kindergarten			
	1983	1982	1981	Total	1983	1982	1981	Total	1983	1982	1981	Total
White Males	4	7	3	14	16	15	19	50	20	15	10	45
Black Males	13	19	16	48	18	16	14	48	4	8	10	22
White Females	5	4	8	17	12	10	18	40	16	18	12	46
Black Females	23	17	15	55	23	7	17	47	9	9	5	23
Total	45	47	42	134	69	48	68	185	49	50	37	136

1981, 1982, and 1983 refer to the year in which that group began first grade.

who entered the first grade were administered the California Achievement Test (CAT), Form C, Level 10. The CAT was given each summer, during June, by three psychometrists on two consecutive days. Testing conditions were kept constant across testing rooms and testing days. During the course of this research, the CAT was administered in April to every elementary student in the public school system as part of the state-wide testing program. The California Achievement Tests were selected to be used as measures of achievement because these scores were the only data available on the entire sample that could be used to make comparisons among the three groups in this study. Classroom teachers administered this achievement battery to their own classes. The teachers were given instructions on instrumentation procedures by the school psychometrist.

Statistics

The relationship between the independent and dependent variable sets was examained using MANOVA procedures (Thompson, 1984). Step one identified the components of one set of the variables, kindergarten attendance and gender, that were most highly related to the components of the other set of variables, California Achievement subscale scores. Thus, two composites were formed. Composite scores were derived to maximize the relationship between the two variable sets by weighting each person's data and summing the weighted scores in each set. From

this point on, the analysis proceeded into traditional univariate methods: one-way, two-way, and three-way ANOVA (Harris, 1975).

The analyses focused on several dependent outcomes and was repeated separately for each subscale score provided by the CAT. The first question addressed was, is there a difference in the rate of growth in the three kindergarten conditions? Second, is there a difference in the overall achievement level attributable to the three kindergarten conditions (Thompson, 1984)?

Since the proportions among the subjects were the same in gender, race, and type of kindergarten attendance from year to year, it was reasonable to put all of the subjects together into one total group for the analysis. The data were also analyzed on a yearly basis. Analyses were limited to the availability of complete data. A maximum of four measurements for two subscales was available, and a minimum of three and two measurements was available on the remaining subscales.

Results and Discussion

One outstanding finding in this study, which was consistent with past research (Cowles & Daniels, 1978; Lazar & Darlington, 1979; Schweinhart & Weikart, 1980; Woodruff, 1980), was that the students who attended kindergarten attained higher average achievement scores in the elementary grades one through three than the students who did not attend kindergarten. The public school kindergarten group scored significantly higher than the no

kindergarten group on 92% of the subscales offered on the California Achievement Test. Both the public school kindergarten and the nonpublic school kindergarten groups scored significantly higher than the no kindergarten group on 81% of the subscales. Therefore, the inference may be drawn that kindergarten attendance, even of various types, can make an impact on later school success (Weikart, Epstein, Schweinhart, & Bond, 1978). This theory has been documented numerous times across the nation (Abram, 1980-81; Lazar & Darlington, 1979; McLean & Nelson, 1982) and now is documented in Mississippi utilizing public school heterogeneous groups of children (Table 2).

Another interesting finding in this study was that, even though not statistically significant, the public school kindergarten group out-performed the nonpublic kindergarten group on the majority of subscales across the majority of grade levels. (Table 3)

One hypothesis which could account for the differences in mean scores between the public school and nonpublic school kindergartens could be the type of program offered. This public school kindergarten (Correro, 1986), founded on a philosophy based on research and pedagogy, is similar to the High/Scope model reported by Weikart to be the most effective kindergarten program (Hechinger, 1986). The students are encouraged to experiment with physical and social forces, to acquire new methods for expressing

Table 2

Significance Table

Oneway
Preschool Only
Total Groups

	Kind.	Grade 1	Grade 2	Grade 3
Phonetic Analysis	999	1 3 2*	1 3 2*	1 3 2
Structural Analysis	999	999	1 2 3*	1 3 2*
Reading Vocabulary	999	1 3 2*	1 3 2*	1 3 2*
Comprehension	999	1 3 2*	1 2 3*	1 3 2*
Total Reading	1 3 2*	1 3 2*	1 3 2*	1 3 2*
Spelling	999	999	1 3 2*	1 3 2*
Mechanics	999	999	1 3 2	1 3 2*
Language Expression	999	1 3 2*	1 2 3*	1 3 2*
Total Language	999	999	1 3 2*	1 3 2*
Computation	999	1 3 2*	1 3 2*	1 2 3
Mathematics Concept and Application	999	1 3 2*	1 3 2*	1 3 2*
Total Mathematics	1 3 2*	1 3 2*	1 3 2*	1 3 2*
Total Battery	999	1 3 2*	1 3 2*	1 3 2*

* Significant results found
999 No score available
Underscored pairs were not significantly different

Group 1 - No Kindergarten
Group 2 - Public Kindergarten
Group 3 - Nonpublic Kindergarten

Table 3

Total Battery--Total Group Preschool Effect

	Grade 1			Grade 2			Grade 3		
	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD
Group 1	134	311.87	29.23	134	357.81	36.04	134	407.82	44.23
Group 2	136	333.77	35.19	136	379.59	43.02	136	431.25	52.46
Group 3	185	328.77	33.43	185	376.52	43.05	185	426.17	51.40
		1 3 2			1 3 2			1 3 2	

Underscored pairs were not significantly different.

Group 1 - No Kindergarten
Group 2 - Public Kindergarten
Group 3 - Nonpublic Kindergarten

feelings and understandings, and to acquire new information through inquiry, experimentation, observation, listening, and reading.

Throughout this study, no causal relationship has been inferred. That is, it can not be concluded that the test score differences among the three groups of students were caused by kindergarten attendance. Extreme caution must be exercised in drawing such an inference because two hypotheses could account for the differences in test scores.

One hypothesis could be that the test score differences were the effects of gains in cognitive development that resulted from kindergarten experiences. Another hypothesis could be that the test score differences were the effects of socioeconomic status. That is, that the parents who placed their children in kindergarten were of higher socioeconomic status and already provided their children with nurturance, encouragement, and an educational environment at home.

Evidence that was available to this study was insufficient to establish the validity of either hypothesis. Variables such as socioeconomic status could not be controlled. However, when examining the results of this study and reviewing the results of similar research reports, it is probable that the significant differences are, in part, explainable by both hypotheses (Braggett, 1975; Cowles & Daniels, 1978; Schweinhart & Barnett,

1984).

Another finding of this study was that the gender effect, included as a control variable, when analyzed using the MANOVA procedure, yielded no systematic significant differences between the performance of males and females. The same finding was reported by Cowles and Daniels (1978). The implication being that kindergarten attendance can be influential on future school success for females and males.

The rates of learning among the three groups of students were nearly identical across grade levels in the majority of subscales (Figure 1). However, a slight diminishing effect of differences of scores among the three groups of students was detected at the second grade on several of the subscales such as Total Reading, Reading Vocabulary, and Language Expression. This slight diminishing effect disappeared in the majority of these subscales with differences widening again at the third grade level (Figure 2). One hypothesis which might account for this finding could be that by second grade, curriculum emphasis consisted more of rote memorization of facts and drills than of problem solving and other divergent activities. Good (1986) suggested that through the experiences of the second grade and maturation, the students become accustomed to less nurturance and more structure at school, and, therefore, the diminished effect disappears by the conclusion of the third grade.

Figure 1

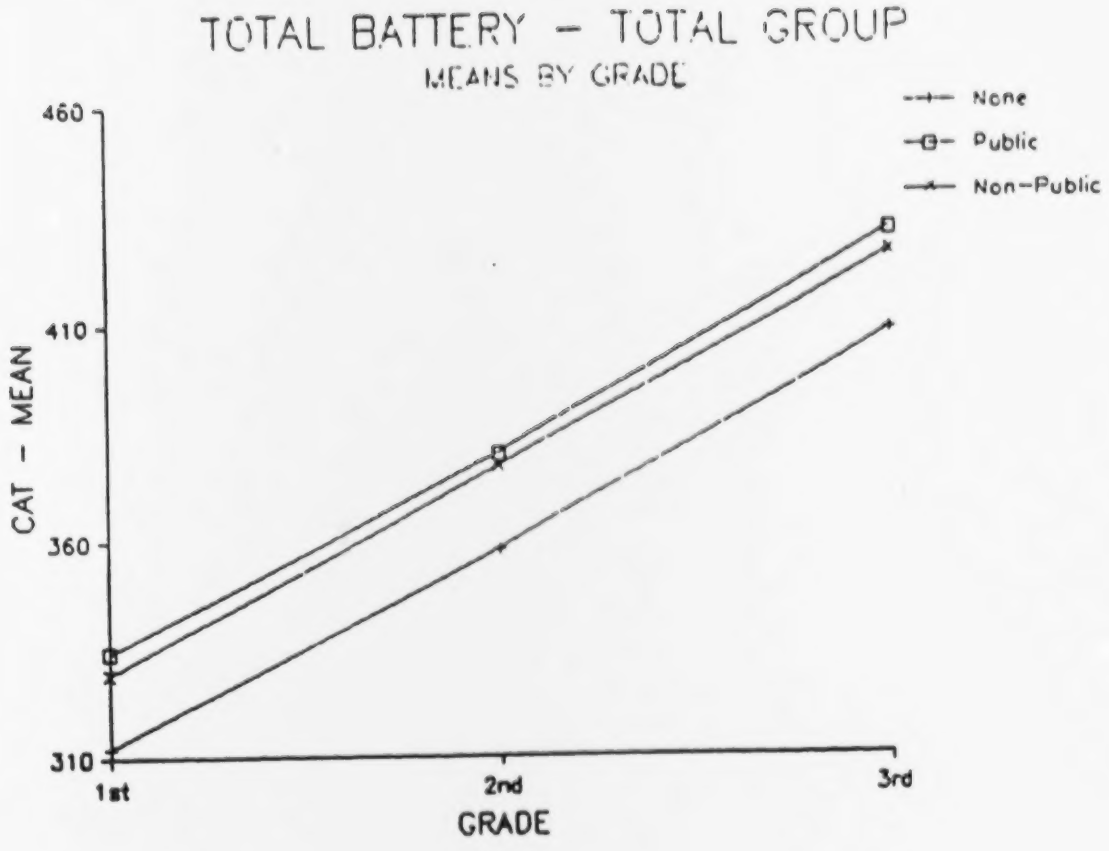
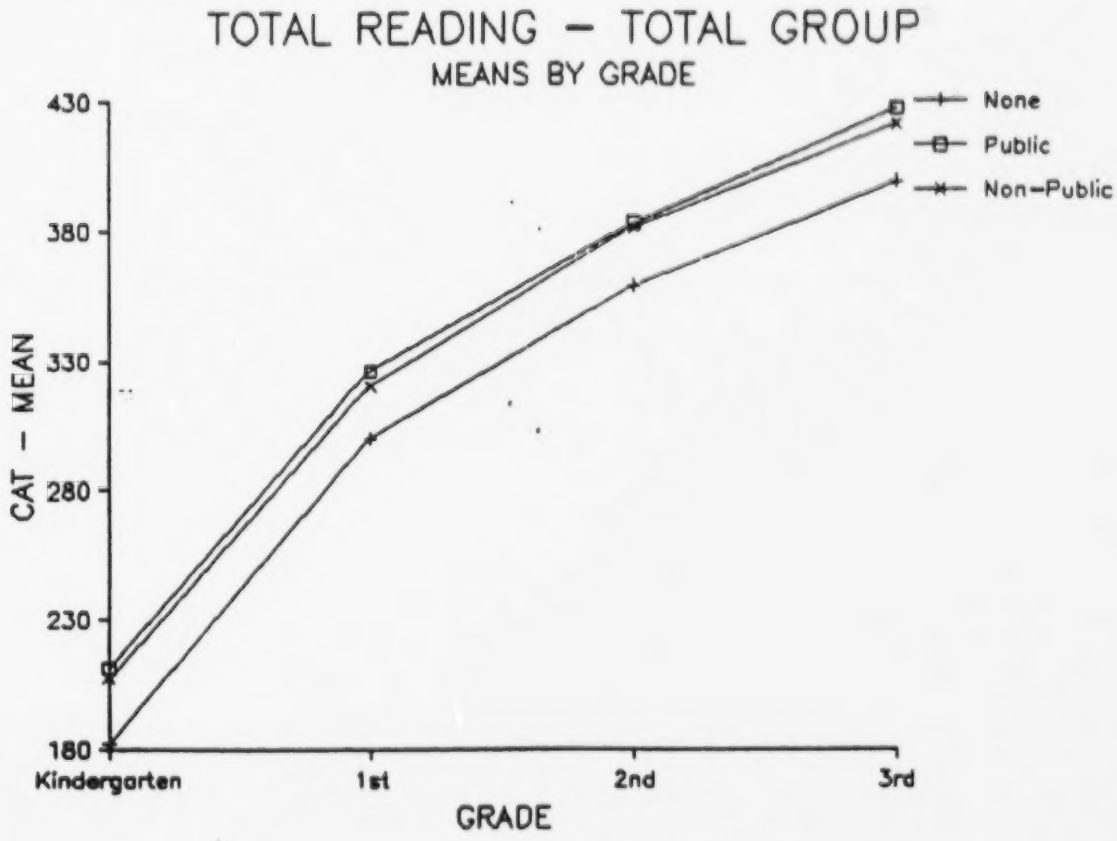

TOTAL BATTERY - TOTAL GROUP
MEANS BY GRADE
None
Public
Non-Public
460
410
360
310
CAT - MEAN
1st
2nd
3rd
GRADE

Figure 2


TOTAL READING – TOTAL GROUP
MEANS BY GRADE
None
Public
Non-Public
430
380
330
280
230
180
CAT – MEAN
Kindergarten
1st
2nd
3rd
GRADE

The major finding in this study was that the differences among the three groups of students on achievement scores were significant across all grade levels (Table 2). The Westinghouse Report (1969) and other studies (Brown, 1978) of the late 1960s reported that any significant findings at the first grade level due to kindergarten and/or preschool attendance faded by the conclusion of the third grade. Findings in this research study were consistent with more recent reports (Lazar & Darlington, 1979; Schweinhart & Weikart, 1980) which indicated that significant differences among the three groups of students continued through the third grade.

In conclusion, this study found that the students who attended kindergarten scored significantly higher on the California Achievement Test through the third grade than the students who did not attend kindergarten prior to first grade. Even though no causal effect can be claimed for this finding, the evidence indicates that the kindergarten experience can be beneficial to heterogeneous groups of children at least through the third grade of elementary school.

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